



Advanced Research Projects Agency • ENERGY

PETRO PROJECT

UNIVERSITY OF ILLINOIS

GENETICALLY ENHANCED SORGHUM AND SUGARCANE

| | | | |
|-----------------------|--|----------------------|-------------------|
| PROJECT TITLE: | Engineering Hydrocarbon Biosynthesis and Storage together with Increased Photosynthetic Efficiency into the Saccharinae | | |
| ORGANIZATION: | The University of Illinois at Urbana-Champaign (UIUC) | LOCATION: | Urbana, IL |
| PROGRAM: | PETRO | ARPA-E AWARD: | \$3,250,000 |
| TECH TOPIC: | Advanced Fuels | PROJECT TERM: | 2/15/12 – 5/31/13 |
| WEBSITE: | www.arpa-e.energy.gov/ProgramsProjects/PETRO.aspx | | |

CRITICAL NEED

Biofuels offer renewable alternatives to petroleum-based fuels that reduce net greenhouse gas emissions to nearly zero. However, traditional biofuels production is limited not only by the small amount of solar energy that plants convert through photosynthesis into biological materials, but also by inefficient processes for converting these biological materials into fuels. Farm-ready, non-food crops are needed that produce fuels or fuel-like precursors at significantly lower costs with significantly higher productivity. To make biofuels cost-competitive with petroleum-based fuels, biofuels production costs must be cut in half.

PROJECT INNOVATION + ADVANTAGES

UIUC is working to convert sugarcane and sorghum—already 2 of the most productive crops in the world—into dedicated bio-oil crop systems. Three components will be engineered to produce new crops that have a 50% higher yield, produce easily extractable oils, and have a wider growing range across the U.S. This will be achieved by modifying the crop canopy to better distribute sunlight and increase its cold tolerance. By directly producing oil in the shoots of these plants, these biofuels could be easily extracted with the conventional crushing techniques used today to extract sugar.



IMPACT

If successful, UIUC's project will enable some of the most productive crops to be grown for biofuels in new climates and on land unsuited to food crops. This could lead to more large-scale production of renewable biofuels to replace petroleum-based fuels.

- **SECURITY:** The transportation sector accounts for nearly all of our petroleum imports. Providing an advanced biofuels alternative to petroleum will allow the U.S. to reduce these imports, improving our energy independence.
- **ENVIRONMENT:** More than 25% of all greenhouse gas emissions in the U.S. come from the transportation sector. Because plants naturally absorb carbon dioxide as they grow, the level of greenhouse gas emissions from biofuels is less than half that of petroleum fuels.
- **ECONOMY:** The U.S. imports nearly \$1 billion in petroleum each day, accounting for the single largest factor in our trade balance with the rest of the world. Biofuels can be produced domestically, allowing us to keep more dollars at home.
- **JOBS:** A self-sustaining biofuels industry that is cost-competitive with oil is well-positioned to see job growth in the agricultural, engineering, and research sectors.

CONTACTS

ARPA-E Program Director:
Dr. Jonathan Burbaum,
jonathan.burbaum@hq.doe.gov

Project Contacts:
Dr. Steve Long, slong@illinois.edu
Lisa Emerson, lemerson@illinois.edu

Partner Organizations:
University of Florida, University of
Nebraska, Brookhaven National
Laboratory